

REDESCRIPTION OF *IAIS ELONGATA*
SIVERTSEN & HOLTHUIS, 1980, FROM THE
SOUTH ATLANTIC OCEAN
(CRUSTACEA: ISOPODA: ASELLOTA)

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Abstract.—*Iais elongata* is redescribed from a freshwater stream on Inaccessible Island, Tristan da Cunha archipelago. The presence of several males, each in amplexus with a stage 1 manca, demonstrates that precopula or mate guarding, which also provides some measure of offspring protection in a swift-flowing stream, occurs in this species.

About 130 specimens of a tiny asellote isopod were collected from a freshwater stream on Inaccessible Island (37°02'S, 12°12'W) in the Tristan da Cunha archipelago of the South Atlantic, by Mrs. Helen James of the Albany Museum, Grahamstown, South Africa. The collection was made in the course of a survey of the invertebrate fauna of the island, and submitted to the Smithsonian Institution for identification. The bulk of the collection is housed in the Albany Museum; a representative sample has been deposited in the National Museum of Natural History, Smithsonian Institution.

Although the isopods were determined to be a recently described species, it was decided to provide a fuller redescription with illustrations, especially as some interesting details of the biology were revealed.

Family Janiridae

Iais elongata Sivertsen & Holthuis, 1980

Figs. 1–5

Iais elongata Sivertsen & Holthuis, 1980:

104, Fig. 34. [Described from 2 ♂ and 1 ♀].

Material examined.—Trondheim University Museum, Holotype, ♂ TL 1.2 mm, paratypes 1 ♂, 1 ♀, (3 slide preparations), station 136, pool of brackish water in cave 2 m

above beach, North Point, Inaccessible Island.—Stream flowing to Blenden Hall beach, Inaccessible Island, 37°02'S, 12°12'W: Sample TDC 2A, 2 ovig. ♀, 21 ♀, 16 ♂ (6 ♂ with manca), 13 Oct 1989.—Sample TDC 11I, 4 ovig. ♀, 20 ♀, 10 ♂ (1 ♂ with manca), 23 Oct 1989.—Sample TDC 11, 5 ovig. ♀, 26 ♀, 30 ♂ (3 with manca), 23/24 Oct 1989 (3 ovig. ♀, 10 ♀, 10 ♂ in NMNH collection).

Description.—Body (Fig. 1A) about 3.5–3.8 times as long as wide. Integument bearing short scattered setae, some stouter than others. Cephalon about one-third wider than midlength, slightly narrower than pereonite 1; anterior margin with broadly rounded rostrum reaching to about midlength of first antennular article. Eyes well pigmented, of 2 ommatidia each. Coxae visible in dorsal view on all pereonites. Pereonite 1 slightly shorter than pereonite 2; pereonites 2–4 subequal in length and width, each with setose anterolateral rounded lobe; pereonite 5 shortest and narrowest; pereonites 6 and 7 with setose posterolateral tergal lobes. Pleon consisting of single short anterior segment plus pleotelson; latter subequal in length to pereonites 6 and 7, lateral margins weakly convex with about 15 short setae, posterior margin weakly convex between uropodal insertions.

Antennule (Fig. 1C) of 6 articles, almost

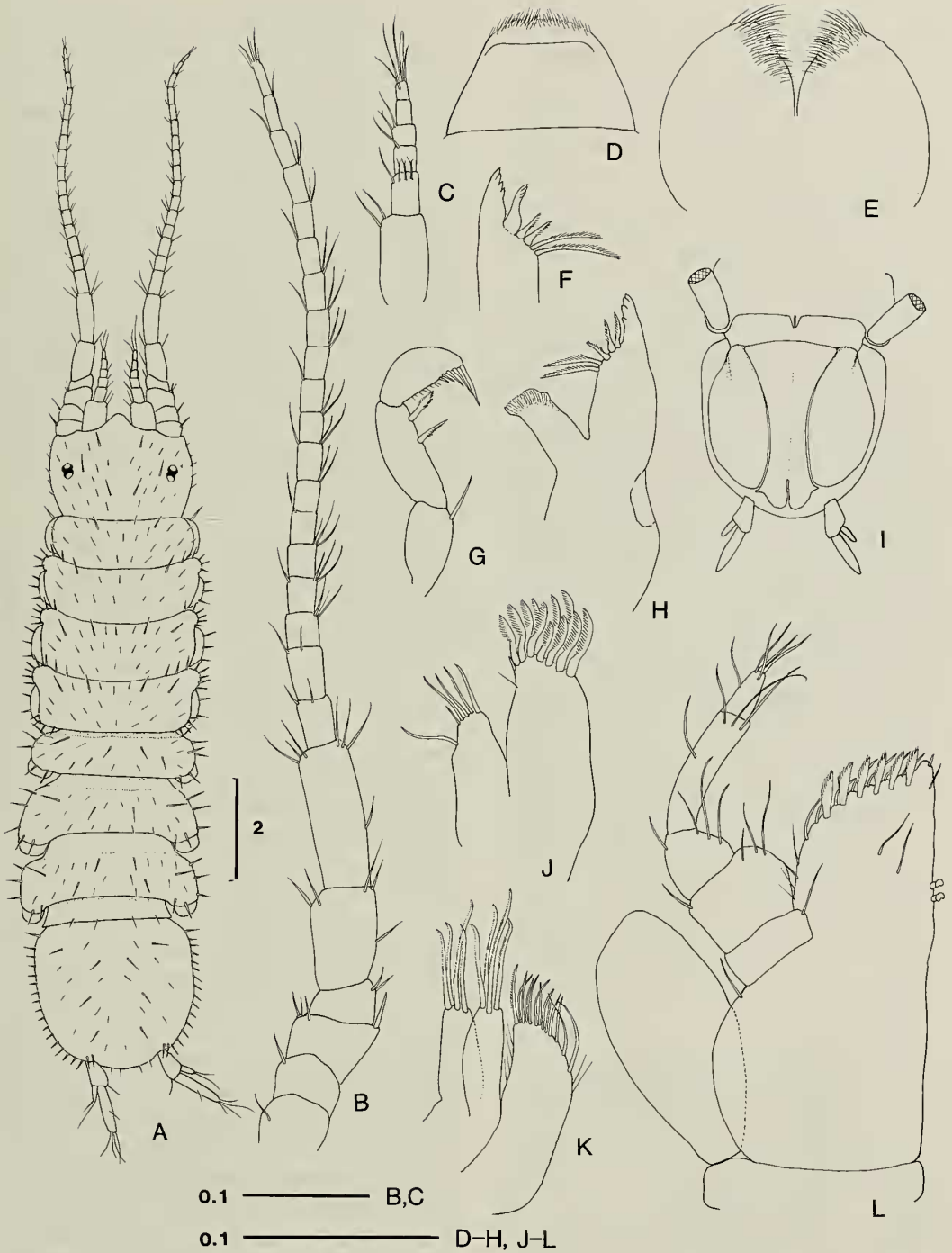


Fig. 1. *Iais elongata*: A, Adult in dorsal view, scale = 0.2 mm; B, Antenna; C, Antennule; D, Upper lip; E, Lower lip; F, Distal part of left mandible; G, Mandibular palp; H, Right mandible; I, Ventral view of last pereonite and pleon of male; J, maxilla 1; K, Maxilla 2; L, Maxilliped.

reaching distal margin of antennal article 5, article 1 widest and longest, twice length of article 2; terminal article bearing single aesthetasc. Antenna (Fig. 1B) equal in length to cephalon plus pereonites 1–5 and half of pereonite 6; peduncle articles 1–4 shorter than wide; article 3 with minute distolateral scale bearing 2 short setae; articles 5 and 6 longer than wide, article 5 about three-fourths length of article 6; flagellum of about 19 setose articles in male, 16 in female. Upper lip (Fig. 1D) about 1.8 times broader basally than midlength, distally broadly rounded, setose. Mandibular palp (Fig. 1G) of 3 articles, article 1 about two-thirds length of article 2, with single strong distolateral seta; article 2 bearing 2 strong bilaterally pectinate setae laterally in distal half; article 3 with mesial margin convex, lateral margin straight with 5 spines increasing in length distally; mandibular molar cylindrical, grinding surface sclerotized, truncate; incisor of 4 sclerotized cusps; spine row of 3 short and 2 elongate spines (left, Fig. 1F), 4-toothed lacinia mobilis, 2 short and 2 elongate spines (right, Fig. 1H). Lower lip (Fig. 1E) deeply cleft, lobes laterally broadly convex, mesiodistally strongly setose. Maxilla 1 (Fig. 1J) with mesial lobe bearing 1 distomesial and 6 distal simple setae; lateral lobe bearing 11 stout toothed spines distally. Maxilla 2 (Fig. 1K), mesial lobe bearing about 13 mostly simple setae mesiodistally; 2 lateral lobes each with 4 elongate unilaterally pectinate setae.

Maxillipedal palp (Fig. 1L) of 5 articles, article 1 broader than long, article 2 twice length and slightly wider than article 1, article 3 three-fourths length and two-thirds width of article 2, articles 4 and 5 slender, article 4 2.7 times length of article 5; endite reaching to midlength of palp article 4, with 2 coupling hooks on mesial margin, distal margin with submarginal row of 6 stout pectinate spines, marginal row of 7 slender setae; epipod ovate, distally broadly rounded, reaching palp article 3. Pereopods (Figs. 2, 3) all ambulatory, pereopod 1 only slightly

shorter than pereopod 2, with biunguiculate dactylus; pereopods 2–3 and 5–7 in male and pereopods 2–7 in female essentially similar, becoming more elongate posteriorly, with basis moderately broad, bearing strong seta on anteroproximal margin, ischium with 2 or 3 setae on anterior margin, merus with group of 3 anterodistal setae, carpus subequal in length to merus and ischium together, with short posterodistal spine, propodus about half width and subequal length of carpus, with short posterodistal spine, dactylus with 3 hooked claws. Pereopod 4 in male about two-thirds length of pereopod 3 or 5, propodus with stout posterodistal spine, dactylus bearing terminal hooked claw, and reflexed subterminal claw.

Female pleopod 2 forming broad operculum (Fig. 4A), midlength subequal to greatest width, distally broadly rounded with 2 submesial setae. Male with short conical penes (Fig. 4B) on posterior sternal margin of pereonite 7, just reaching base of pleopod 1. Male pleopods 1 and 2 together forming operculum; pleopod 1 elongate (Fig. 4B), rami with fused portion 3.5 times longer than free, distal rami rounded and bearing about 7 simple setae, distolateral projection short, narrowly rounded. Pleopod 2 (Fig. 4C) peduncle roughly triangular, lateral margin convex; exopod with 2 articles subequal, article 2 distally rounded; endopod with article 1 about half length of article 2, latter slender, curved, tapering to narrow apex reaching distal end of peduncle, with narrow open furrow. Pleopod 3 (Fig. 4D) with exopod of 2 articles subequal in length, article 1 wider than 2, lateral margin convex, setose; article 2 tapering distally lateral and mesial margins setose, with single simple setae apically, endopod roughly ovate, with irregular margin, reaching distal half of exopod article 2. Pleopod 4 (Fig. 4E) exopod of single slender article bearing single elongate distal seta; endopod broad, roughly ovate, with irregular margin. Pleopod 5 (Fig. 4F) of single irregular roughly ovate ramus.

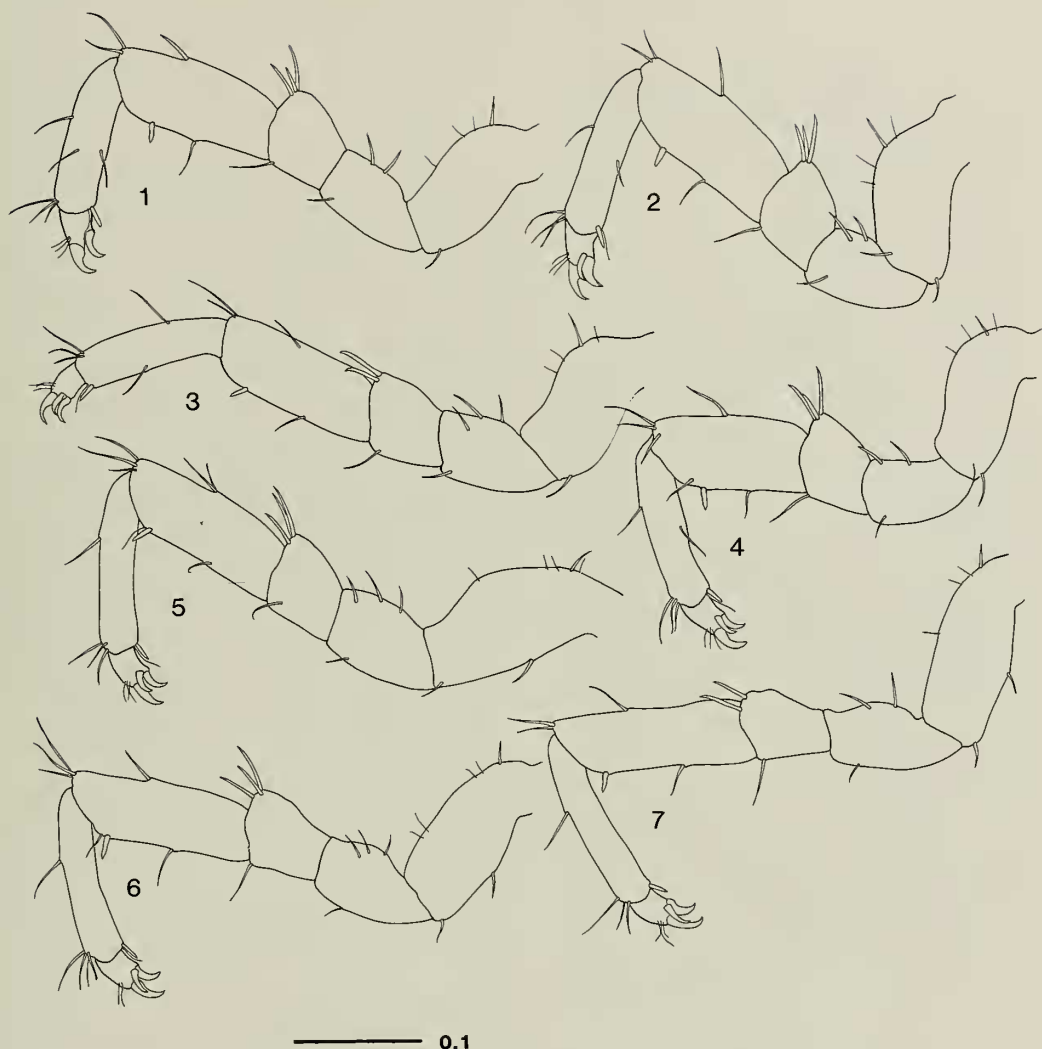


Fig. 2. *Iais elongata*, female, pereopods 1-7.

Uropod (Fig. 4G) about half length of pleotelson, peduncle with single strong distomesial seta; endopod 2.8 times length of exopod, with several terminal simple setae; exopod with 3 terminal setae.

Habitat.—The specimens were collected from a narrow, fairly swiftly flowing stream (about 60 cm wide, 50 cm deep), arising from a spring and running less than one kilometer before dropping to a boulder beach. The stream water was clear, pH neutral; the grass *Spartina arundinacea* was

growing closely along the banks. The specimens were found under stones in the stream, usually several animals per stone.

Gut contents.—Determined from 2 cleared specimens: several kinds of diatoms, spore-like structures, and fine filamentous algal-like structures in addition to unidentifiable fragments. The female paratype, cleared and mounted on a microscope slide, has the entire gut packed with diatoms.

Size.—Males total length (tl) 1.08–1.30 mm, possibly in 2 size-groups; males with

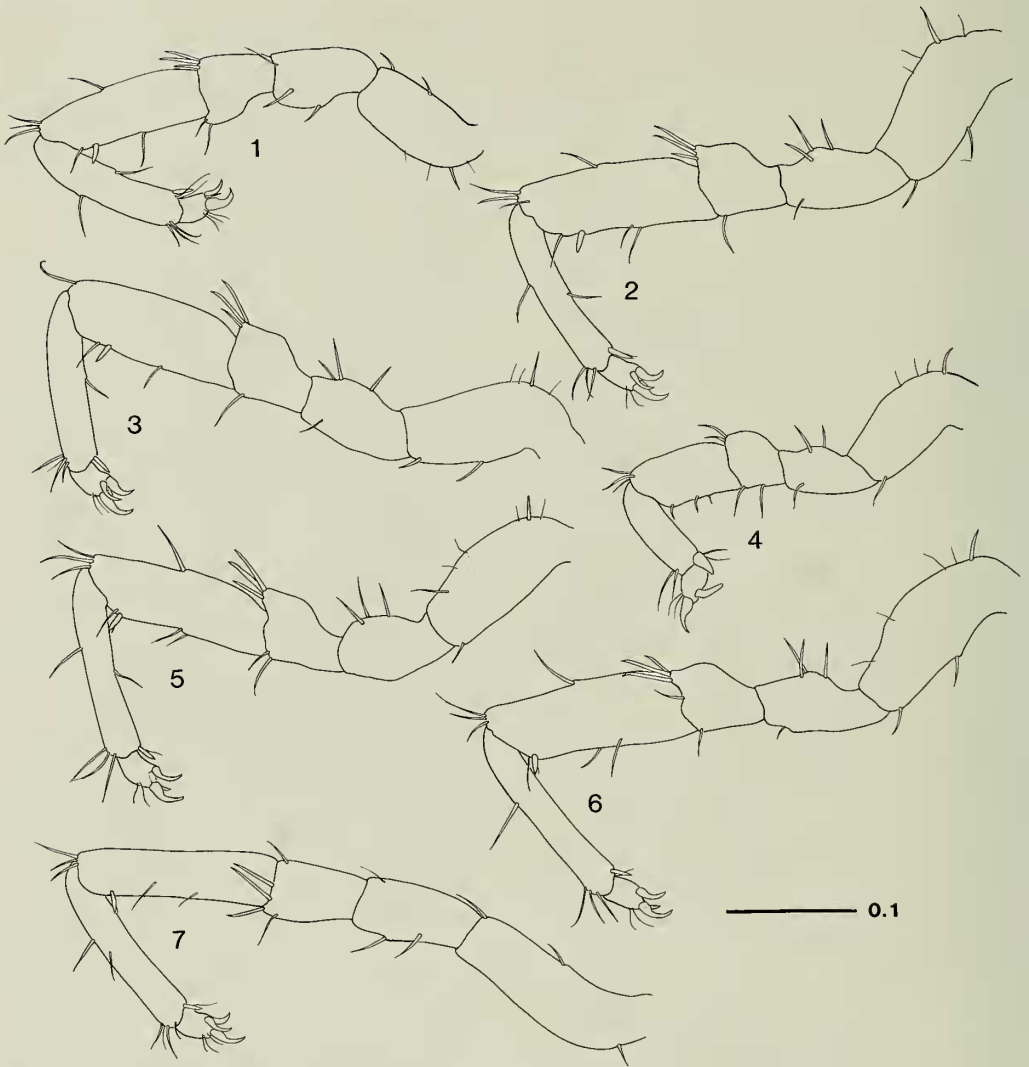


Fig. 3. *Iais elongata*, male pereopods 1-7.

manca tl 1.13-1.30 mm, manca tl 0.43 mm; females tl 0.75-1.45 mm, possibly in 2 size-groups; ovigerous females tl 1.20-1.48 mm.

Ovigerous females (average for 11 specimens tl 1.32 mm) somewhat larger than mature males (average for 9 specimens tl 1.22 mm).

Brood size.—Contents of brood pouch in ovigerous females: 1 egg-1, 2 eggs-2, 3 eggs-2, 2 manca-4, 3 manca-1.

Mate guarding.—Ten of the 56 males col-

lected were each found to be carrying a single large manca, tucked between the pereopod bases (Fig. 5). All the mancas (manca I stage, 0.43 mm total length) were female; all were oriented in the same way, i.e., dorsum of manca pressed to ventrum of male, head directed posteriorly with respect to the male. This is clearly a case of mate guarding, with the juvenile partner held in precopula. The fourth pereopods of the male, which hold the manca in position, are two-thirds

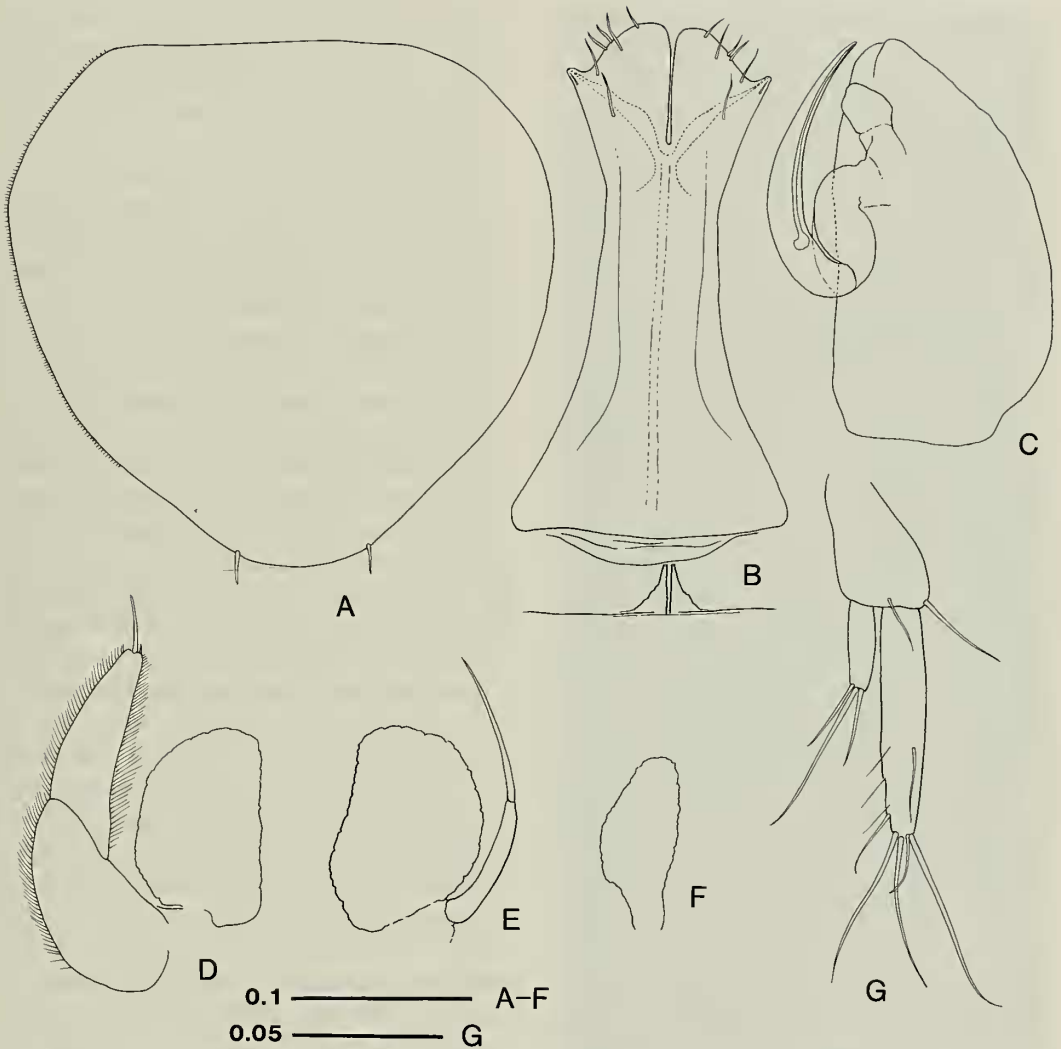


Fig. 4. *Iais elongata*: A, Female pleopod 2 operculum; B, Male pleopod 1 and penes; C, Male pleopod 2; D, Pleopod 3; E, Pleopod 4; F, Pleopod 5; G, Uropod.

the length of the third or fifth pereopods, and have one of the dactylar claws reflexed.

This precopulatory mate guarding strategy (see Dunham & Hurshman 1991, Franke 1993) has been observed in a number of crustaceans (Ridley 1983) including isopods. Precopula ensures that the male is present when a female is receptive during the brief biphasic molt, either by being passively attached to the female, or by actively carrying her around.

Copulation in isopods takes place during the biphasic molt to the adult brooding phase. The posterior half molts first, followed by insemination, then the anterior half molts, along with deployment of oostegites. Eggs are released into the broodpouch once molting is complete (Veuille 1978). Most isopods have internal insemination (Ridley 1983). Several asellote genera have been noted to resort to mate guarding; species of *Jaera* and *Munna* carry



Fig. 5. *Iais elongata*, composite SEM photograph of adult male holding female manca.

around potential mates (Veuille 1980, Hessler & Strömberg 1989, Franke 1993). As in the present species, in *Jaera* the fourth pereopod of the male is shortened and bears specialized spines for clasping the female

during precopulation and copulation (Veuille 1980). The same leg is used in amplexus in the primitive asellotes *Caecidotea* (Lewis & Bowman 1981) and *Asellus* (Gruner 1965).

At a maximum total length of 1.48 mm, this species is within meiofaunal size-range. Many meiofaunal organisms exhibit regressive evolution of body size (Swedmark 1964) accompanied by reduction in number of eggs and offspring per brood. In this case, four eggs was the maximum number observed within a brood-pouch while two manca per brood pouch was the commonest number ($n = 4$) of manca observed. Given this very low number of offspring per brood, continued care of offspring after release from the brood-pouch would greatly improve the survival rate, especially given the habitat of a fairly swiftly flowing stream. This post-marsupial care is afforded by the male's use of precopulatory mate guarding of the female manca. The male is already adapted for amplexus, and this adaptation becomes a form of offspring care. This double use of an adaptation is more parsimonious than if the female, which lacks any clasping modifications, were to provide some form of post-marsupial care. The use of the fourth pereopod of the male for hanging onto the female is probably a primitive character within the Asellota, being found in the asellids, while the loss of one of the three dactylar ungui, and the flexing of one of the remaining ungui along with marked shortening of the leg seen in the janirids, represent a more advanced state than that seen in the asellids.

Remarks. — The genus *Iais* Bovallius, 1886, at present contains five species (see Nierstrasz 1941:53; Menzies & Barnard 1951:138; Coineau 1977:436). Menzies & Barnard, 1951, expressed the opinion that true species of *Iais* are always found in association with sphaeromatid isopods, and that the free-living species may well belong to a different genus. There are at least three records of free-living *Iais*: *I. pubescens* of Barnard, 1965 from Gough Island, *I. aquilei*

Coineau, 1977 from St. Helena Island, and *I. elongata* Sivertsen & Holthuis, 1980 from Inaccessible Island in the Tristan archipelago. All three of these South Atlantic island records are from freshwater habitats at varying (but never great) distances from the sea. Possibly we are dealing with a complex of island species of a genus other than *Iais*. Material from Tristan da Cunha, taken from the fully marine sphaeromatid *Isocladus tristanensis* and identified as *I. pubescens* by Barnard (South African Museum, A2286, A2452) appears to be closely similar to *I. pubescens*, widespread through the southern ocean. Examination of commensal material from Auckland, New Zealand, taken from *Exosphaeroma gigas*, from southern Peru taken from *Sphaeroma peruvianum*, along with the abovementioned Tristan material reveals considerable variation in body and appendage proportions, suggesting a complex of species rather than a single circumpolar species, masquerading under the name *I. pubescens*.

Iais elongata is very similar to *I. aquilei* from St. Helena Island, even in the total length of adult males and females. Coineau's thorough description and figures (1977), however, do reveal some subtle differences: the basal article of the antennule is relatively broader in *I. aquilei*; the third article of the mandibular palp has 3 distal spines (5 in *I. elongata*); the maxillipedal endite has 8 distal broad spines (6 in *I. elongata*); maxillipedal palp article 4 is relatively longer in *I. elongata*; there are fewer distal setae on pleopod 1 ♂ in *I. elongata*; the endopod of pleopod 3 is relatively smaller compared with the exopod in *I. elongata*; the exopod of pleopod 4 and especially the single distal seta are relatively larger compared with the endopod in *I. elongata*; the uropodal exopod is relatively more elongate compared to the endopod in *I. aquilei*.

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